

"THE SALMON DANCE ON ITS FIRST ARRIVAL"

Yil-me-hu

WINTER 2013/2014



THE NISQUALLY WATERSHED SALMON RECOVERY NEWSLETTER | WHAT'S INSIDE:

Ohop Valley Restoration Enters Phase III

Chinook respond to Nisqually River Estuary Restoration

NISQUALLY STREAM STEWARDS FREE COURSE



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Cover photo: A natural Nisqually Chinook salmon in lower Muck Creek.

Photo: David Troutt

If you would like to learn more about the Nisqually watershed, visit the Nisqually River Council's website at <http://www.nisquallyriver.org/>. The Nisqually River Council is implementing its Nisqually Watershed Stewardship Plan, which seeks to encourage sustainability efforts in the watershed while continuing the long legacy of working toward collaborative environmental management with watershed communities. Visit the website to find out more information about this and other stewardship efforts within the watershed. You can also become a Facebook friend of the Nisqually River Council to get updates on Nisqually watershed news and events.



Printed with soy-based ink on recycled paper that is certified by the Forest Stewardship Council.



Yil-me-hu

Yil-me-hu, Nisqually word that means "the salmon dance, on its first arrival."

The first fish ceremony — The first fish caught in the spring was prepared in an earth pit stove, shared and eaten by members of the village. The bones, left intact, were returned to the river, pointing upstream. This display was symbolic. It meant that the villagers were respectful to the fish spirits and wished that, because the ceremony had been done correctly, many more fish would come up the stream during that year. A dance followed the ceremony called the "yil-me-hu," a Nisqually word that means "the salmon dance, on its first arrival."*

* Carpenter, Cecilia Svinth, Fort Nisqually: A Documented History of Indian and British Interaction. A Tahoma Research Publication. 1986. p13.

Nisqually Indian Tribe



Natural Resources Department

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Yil-me-hu is published by the Nisqually Tribe Natural Resources Department to provide information about activities associated with the protection and restoration of salmon and their habitat in the Nisqually watershed. The newsletter is distributed to persons and entities who are interested in or engaged in salmon recovery efforts, and to the community at large.

DIRECTOR'S CORNER



Sometimes, at great risk, it is wise to look a gift horse squarely in the mouth. This past salmon season presented that unique opportunity; so, let's all take a good look.

This past summer we successfully operated the mainstem weir from July through early September and we were witness to an amazing sight – the return of the pink salmon. We regularly passed 20,000 pink salmon per day at the weir for many days, ending in a total number well over 200,000. In talking to our co-managers this week it appears that the pre-season estimate of 750,000 may be conservative and the actual number may in fact reach 1.0 million! This will be the largest documented return of pink salmon in the Nisqually.

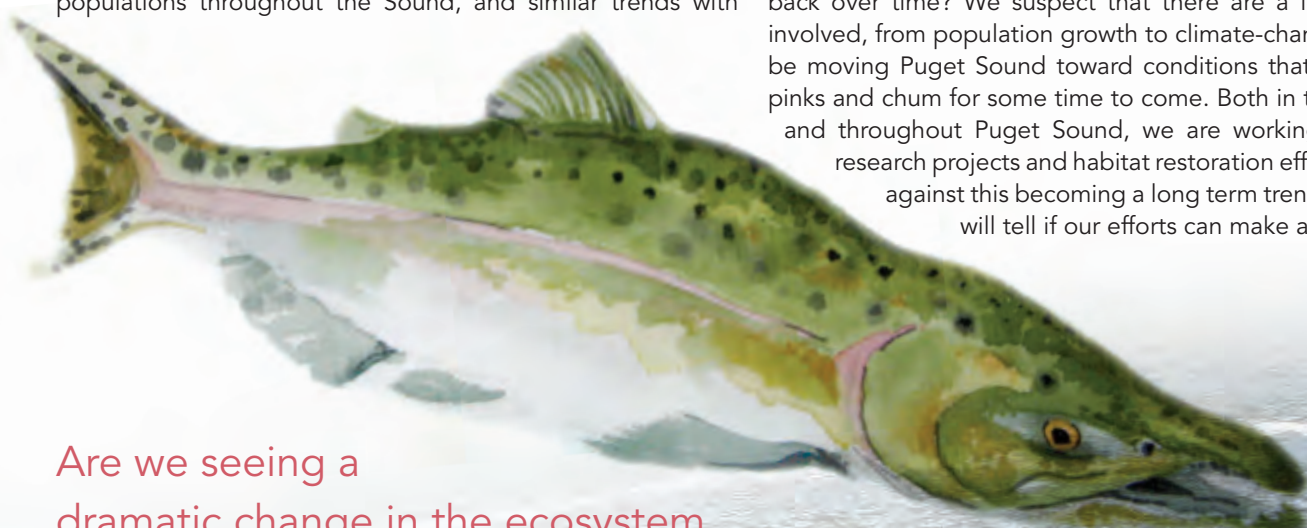
This return of pink salmon is a blessing and perhaps an indication of a problem. A blessing in that the nutrients that the salmon are bringing back to the Nisqually River are critically important to the overall health of the watershed. Over 127 different species of plants and animals rely on these salmon. From fertilizing the trees along the river banks, to feeding eagles and bears and people, to boosting insect production for future generations of salmon, this connection from the sea to the river is vital to long term sustainability.

Miraculous yes, but some moderation would be nice, and therein lies a possible problem. This may be another indication that Puget Sound is not healthy. The explosion of pink salmon populations throughout the Sound, and similar trends with

most chum salmon runs, is beginning to tell a story. It appears that the salmon with the most simple life histories (such as pink salmon that migrate quickly through Puget Sound and feed on plankton and the like) are surviving in record numbers and those other more complex salmon like coho, Chinook, and steelhead, that may reside longer and tend to feed on larger prey like herring are not doing well at all. It would appear that primary production in Puget Sound is doing well (perhaps too well with plankton blooms becoming more common and larger in area) but all forage fish species are not.

Are we seeing a dramatic change in the ecosystem in Puget Sound or are these trends cyclical and will we see things shift back over time? We suspect that there are a lot of factors involved, from population growth to climate-change that may be moving Puget Sound toward conditions that could favor pinks and chum for some time to come. Both in the Nisqually and throughout Puget Sound, we are working on lots of research projects and habitat restoration efforts to buffer against this becoming a long term trend. Only time will tell if our efforts can make a difference.

Are we seeing a dramatic change in the ecosystem in Puget Sound or are these trends cyclical and will we see things shift back over time?



Ohop Valley Restoration Enters Phase III

As restoration Phases I and II of the Ohop Valley are completed, the first steps of Phase III restoration were taken early in 2013 with the purchase of 1 mile of Ohop Creek by the Nisqually Land Trust. The 1 mile of property downstream of Ohop Creek restoration Phases I and II was previously owned by the Burwash Family and used for various agricultural activities since the early 1900s.

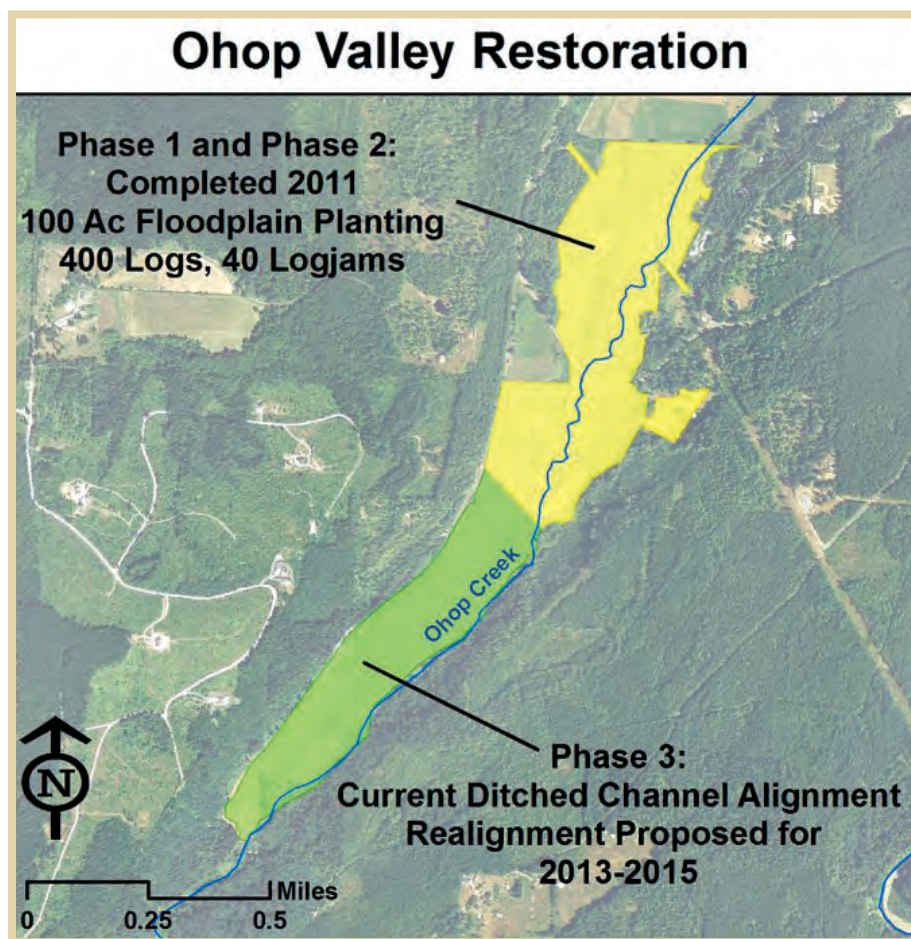
"The cumulative Phase I-III restoration area will provide and improve spawning and rearing habitat for threatened Chinook salmon, and rearing habitat for Coho salmon and threatened Steelhead," said David Troutt, natural resources manager for the Nisqually Indian Tribe. "This restoration effort will also improve salmon productivity, furthering the goals of the Nisqually Indian Tribe's treaty rights."

This restoration project is the next piece of a decades-long effort to restore the Ohop Valley. The Phase III proposal along with the earlier phases have been ranked as one of the highest priorities for the Nisqually Indian Tribe, and only the Nisqually estuary and the Mashel River are ranked higher for salmon productivity and recovery in the Nisqually River Watershed.

Citizen science surveys and community planting events have brought hundreds of citizens to the Ohop Valley site. Northwest Trek has been leading Nature Mapping trips at the Phase I/II restoration site for the last several years. Those trips have provided opportunities for people to see a restoration project develop, and for them to witness a shift in habitat availability and species diversity.

"The combined restoration area will become a model for restoration, both locally and throughout the region," said Joe Kane, executive director of the Nisqually Land Trust. "Local citizens will be able to literally watch the Ohop Valley transform back into a functioning, natural stream valley."

This restoration effort will also improve salmon productivity, furthering the goals of the Nisqually Indian Tribe's treaty rights.



Aerial photo shows completed Phase I & II in yellow, and proposed Phase 3 in green.

Volunteers installed an additional 600 of the remaining native plants at Ohop Phase II in October.



Ohop Monitoring is an Important Part of Restoration

Habitat restoration work began in the Ohop Valley in 2009, after the Nisqually Land Trust acquired the Peterson Farm. That restoration project involved elevating and re-meandering one mile of the stream channel which had been ditched and straightened during the early 1900s to create conditions favorable for agricultural activities. During the restoration process, tens of thousands of native trees and shrubs were installed by the Nisqually Tribe’s crew of restoration technicians, and hundreds of students and adult volunteers (see accompanying information) to re-establish the riparian forest that once covered the Ohop Valley.

During a monitoring visit, Nisqually Field Crew Supervisor Emiliano Perez (L), and Natural Resources Technician Eddie Villegas (R), measure the canopy and record the species of plants at the Phase II Ohop Creek restoration site. Nisqually Technicians not shown: Sam Stepetin, Kyle Kautz, and Robert McGee.




Photo: Cathy Sampelle



OHOP PHASE I & II: PLANTS INSTALLED & ACRES PLANTED	2013-2014	8 acres	5480 plants
	2011-2012	14 acres	9150 plants
	2010-2011	45 acres	31400 plants
	2009-2010	42 acres	28600 plants

Since habitat restoration began in the Ohop Valley, monitoring of the site has occurred to ensure the establishment of native vegetation, and to determine whether there is encroachment of invasive plants as the site transitions from pastureland toward a natural forest habitat setting.

A grant from the US Fish and Wildlife Service has allowed for more intensive monitoring, including establishing permanent transects to document how different plant species change over time, and tracking fish usage of the restored channel. Monitoring restoration plantings helps determine what maintenance is needed to ensure project success. Most plantings are actively maintained for at least three years following installation.



Restoration of the Nisqually River Estuary Restoring Feeding and Growth Opportunities for Juvenile Chinook Salmon

In the fall of 2009, five miles of dike were removed from the Nisqually river estuary, reconnecting over 700 acres of land to the tides of Puget Sound for the first time in a century. This was the culmination of three smaller projects over the previous decade that also removed sections of dike within the estuary. In total, 900 acres of land have been reconnected to tidal flow, the largest tidal marsh restoration effort to date in the Pacific Northwest. The dike removals were a collaborative effort between the Nisqually Indian Tribe, the Nisqually National Wildlife Refuge, and Ducks Unlimited to restore the Nisqually River estuary and to help recover species that rely on the estuary for part of their life cycle. In particular, the dike removals were aimed at recovering the threatened Nisqually fall Chinook salmon population and increasing Chinook salmon harvest opportunities for the Tribe.

Removing the dikes is expected to help recover the Nisqually Chinook salmon population by dramatically increasing the area of intertidal estuarine wetlands where juvenile salmon can feed on invertebrate prey. Estuaries are highly productive ecosystems home to abundant and diverse invertebrate populations that provide excellent feeding opportunities for juvenile salmon. As a result of the productive feeding, salmon can grow rapidly in estuaries. Several studies have shown that there is a positive relationship between early marine size of juvenile salmon and survival to adulthood. Thus, the more a salmon can eat and grow while in an estuary, the more likely it is to survive.

A group of scientists from the Nisqually Tribe, the US Geological Survey, and the University of Washington has been working together to evaluate the effectiveness of the dike removals. Because of the relationship between early marine size and survival rates for salmon, one of the ways we evaluated the restoration was by comparing juvenile Chinook salmon growth in the restored and natural marshes. Essentially, we wanted to know whether a fish spending part of a day feeding in one of the recently reconnected marshes would be able to grow as much as a fish in a natural, "reference" marsh that was never diked.

The most direct way to address this question would be to actually measure growth rates of fish in the different habitats. However, because juvenile salmon are highly mobile and are likely to move between different marshes, directly measuring growth is difficult. Instead, we collected data on the biological and physical variables



Photo: Chris Ellings

A natural Nisqually Chinook juvenile salmon.

is Rapidly ities for

Trapping Chinook at
the Nisqually National
Wildlife Refuge Estuary
Restoration site.



Photo: Chris Ellings

in natural and restored marshes that largely control fish growth rates, and then input these data into a model that we used to simulate juvenile Chinook salmon growth potential in the restored and reference marshes. Salmon growth is largely controlled by the amount of food they consume, the caloric quality of their food, and the temperatures they experience. Thus, these were the variables we measured.

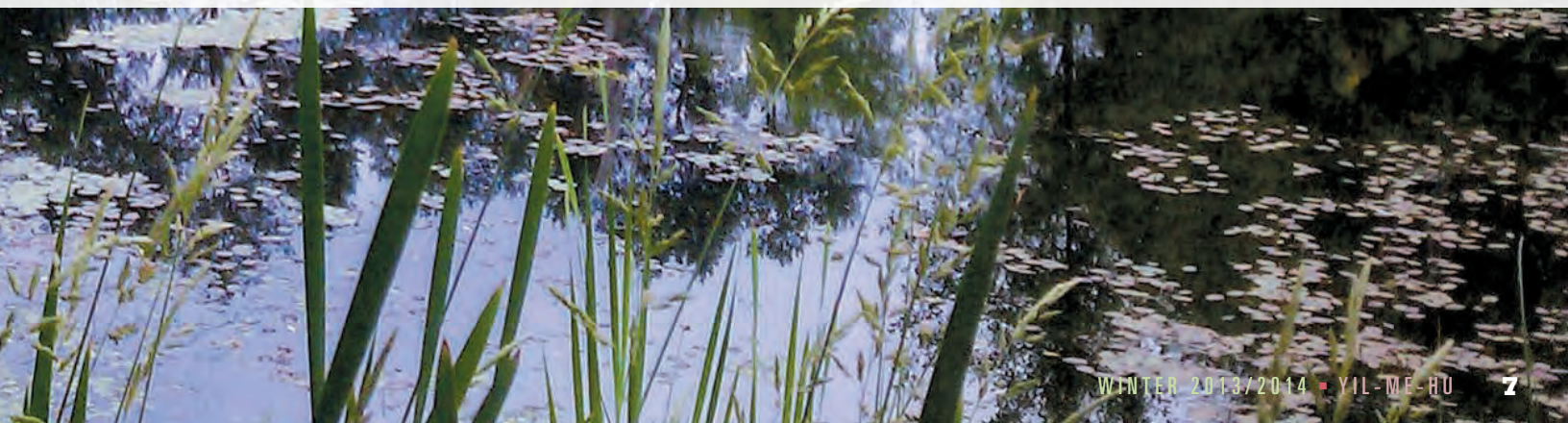
To determine whether Chinook salmon are able to grow as much in the restored marshes as natural marshes, we sampled two tidal channels in the restored marshes and two tidal channels in reference marshes once a month from April to July over three years after the 2009 dike removal. In each channel we captured juvenile Chinook salmon, sampled their diets to see how much and what they were eating, and used data loggers to continuously measure the water temperature in each channel. We used these data as inputs to a bioenergetics model, which we used to simulate Chinook salmon growth potential in the four marshes.

We found several lines of evidence indicating that restoring tidal flow to the Nisqually River estuary is rapidly restoring many of the ecological functions of natural tidal marsh ecosystems that are important to juvenile Chinook salmon. Stomach fullness of Chinook salmon was equivalent between the reference and restored marshes, suggesting that prey availability and feeding opportunities were similar between restored and reference marshes. We found that the diet

composition of salmon differed between restored and reference marshes, although their diets became more similar as time-lapse since the restoration increased.

The caloric richness of prey consumed by Chinook salmon was actually greater on average in the restored marshes than the reference marshes. The bioenergetics model showed that on average, growth potential for juvenile Chinook salmon was equivalent between the marshes. However, the model also demonstrated that growth potential was more variable in the restored marshes due to more variable and warmer temperatures in the restored marshes than in the reference marshes. We suspect that the temperature differences between the marshes are due to the lack of overhanging marsh vegetation in some of the restored marshes that would typically shade the channels. Currently, the Restored tidal channels are shallower and wider than the natural tidal channels, meaning the water in those channels is more exposed to the sun and air temperatures.

In summary, our research is showing that many attributes of natural estuary wetlands, such as the foodwebs that salmon feed upon, are responding positively and rapidly to the restoration of tidal flow. However, other attributes, such as water temperature and the physical morphology of the reconnected tidal channels, will take longer to achieve natural conditions.





Nisqually fish research biologist Sayre Hodgson installing a PIT tag.

Nisqually fish research biologist Sayre Hodgson, left, Heidy Barnett, center, and Chris Kohn right, of West Fork Environmental, netting coho salmon during a PIT tagging field research outing.

Research work placing Passive Integrated Transponder (PIT) tags in the abdomens of over 800 juvenile Coho salmon that were netted along several stretches of Ohop, 25 Mile, and Lynch Creeks, began during the fall of 2012. Since then, more juvenile coho have been captured, tagged, and released in Ohop Creek and Lynch Creek, and some preliminary results have been revealed.

"The PIT tags allow us to detect the fish as they swim by any of the four antennas that we placed in different parts of Ohop Creek," said Sayre Hodgson, fish research biologist for the Nisqually Indian Tribe. Equipment placed next to the antennas record the PIT tag identifying information. The recorded information shows which areas of the creek (restored or un-restored) the fish spend more time in.

Preliminary 2012 data showed that 14% of the total tagged coho were detected at a restored section of Ohop

JUVENILE COHO SALMON RESEARCH REVEALS PRELIMINARY RESULTS

Creek, while 22% of the total were detected near at least one of the four antennas, including those in un-restored sections of the creek. Most of the tagged coho seemed to be out-migrating and spent less than a day at the restoration site, but some tagged fish spent up to 30 days in the vicinity of the restored section of the creek.

Over 1,000 juvenile coho salmon were tagged in Ohop Creek and its tributaries during the fall of 2013. Researchers are awaiting data on the timing, movement, and residence patterns of these fish. "This pilot study may be expanded in the future to investigate how fish-use changes in restored areas, as the habitat changes after restoration. And, results can be used to monitor the success of the restoration work that has been done, guiding future restoration projects," said Hodgson.

Spawning Surveys Critical to Salmon Recovery

The Nisqually Indian Tribe has been fishing Chinook salmon for thousands of years. The Tribe leads a massive effort to recover Chinook in the Nisqually River Watershed in order to preserve this vital cultural connection. An important piece of the recovery effort is tracking the number of Chinook that spawn in the Nisqually River. This is accomplished with spawning ground surveys.

Spawning ground surveys for Chinook are conducted by the Nisqually Indian Tribe and supplemented by the Washington Department of Fish and Wildlife. The surveys are essential for tracking recovery and for planning all recreational and commercial fisheries. Fisheries are able to take up to a certain percent of Chinook under a federal "4d" permit and that percentage is determined on an individual watershed basis according to pre-established recovery rates. This is regulated by federal law, and violators are subject to prosecution.

Spawning ground surveys help determine pre-season and in-season planning decisions by determining how many Chinook spawned, and the composition of the run (numbers of hatchery and wild Chinook counted). The Tribe surveys for live Chinook, and takes samples from carcasses on the spawning grounds to determine age, length of fish, sex, and origin of the Chinook.

- **Age** is determined by reading the fish's scales, which is analogous to counting tree rings, and helps us forecast the number of 3, 4, and 5 year old fish coming back the following year.
- **Length of fish** is associated with age and can be used to determine growth rates, which is a measure of productivity.
- **Sex** is determined by the biologists and technicians from physical traits, and is important in understanding the productivity of that spawning group.
- **Origin** is determined in a few different ways.

The several ways of "marking" fish to identify their hatchery **origin** include removal of the adipose fin and/or insertion of a microscopic coded wire tag in the fish's snout. The wire is coded with a number associating that fish to a specific hatchery and its brood year. The unclipped and un-coded wire tagged fish are more difficult to determine **origin**, and are the group of fish that are managed for recovery. Some could be unmarked hatchery fish that were missed in the hatchery during fin clipping, or some could actually be wild fish.

The **Origin** of unmarked fish is determined by analyzing the otolith. Otoliths are bone like structures in the inner ear of the fish that have daily 'rings' which can be counted to determine age and growth. Age and growth patterns on the otolith from hatchery fish and wild fish are different, so distinguishing one from the other can be done by a trained biologist in a lab.

When hatchery Chinook stray and spawn with wild Chinook they reduce the 'fitness' of the fish, or ability of the fish to reproduce effectively, by diluting the habitat driven adaptation



Photo: David Trout

Craig Smith holding a Chinook salmon otolith.

of the fish. In order to restore the fitness of wild Chinook, the Nisqually Indian Tribe has operated a fish weir for the last three years. The purpose of the weir is to catch all Chinook going up stream, to cull out hatchery Chinook and to allow the wild Chinook to continue on to the spawning grounds.

The Chinook without any discernible mark from a hatchery are passed upstream of the weir after being sampled for age, length, sex, and origin (DNA sampling can be done without harm to the fish) and jaw tagged for recognition on the spawning grounds. The jaw tags help determine the efficiency of the weir by indicating the proportion of the total number of spawners that were successfully captured by the weir.

Recovering Chinook in the Nisqually Watershed is a massive undertaking. Thousands of acres of land have been protected and miles of river have been restored over the last 10 years in order to improve the productivity of wild Chinook. Additionally, harvest has been reduced by 50% and a large, mainstem weir is in place to allow wild Chinook to adapt to the natural environment. One of the most important and underappreciated responsibilities is performing the difficult task of finding and counting fish on the spawning grounds.



Photo: David Trout

Nisqually Salmon Harvest Program Manager, Craig Smith, extracts an otolith from a Chinook salmon during a spawning survey.

Shellfish Program Manager New to Nisqually



Photo: Don Perry

Margaret Homerding, assessing shellfish vitality.

Japanese oyster drills, an invasive species in Puget Sound.



Photo: Don Perry



FREE COURSE
OFFERS
VALUABLE SKILLS
AND
KNOWLEDGE

Want to acquire new skills and learn about many important natural resources topics and the Nisqually River Watershed? Then, a reserved seat awaits your phone call or email enrollment in the free Nisqually Stream Stewards training course.

Offered at no cost for 7-weeks each summer during the months of June and July, the Nisqually Stream Stewards course is packed with hands-on opportunities to learn new skills and experiences. "The training and skills I learned definitely gave me a better opportunity to land a job in the natural resources field," said Joseph Parente, graduate of the 2013 Stream Stewards course.

The 2013 Stream Stewards class learned how to analyze water samples, how to collect and identify benthic macroinvertebrates while also learning about the salmon and geology of the Nisqually River Watershed. Field tours included visiting several restoration sites, Nature Mapping at the largest restoration site north of San Francisco Bay, visiting Pack Forest old growth trail, Nisqually Indian Tribe's salmon hatchery, and an actively managed prairie habitat area.

First Eatonville Salmon Fest a Success

Sponsored by the Nisqually Indian Tribe and the Nisqually River Foundation, the first Eatonville Salmon Fest at Mill Pond Park in Eatonville on Saturday October 19, was a huge success. The event offered learning activities and fun for the entire family.

The event began with a blessing by Nisqually Tribal Elder Bob Sison, followed by the Squally Absch Canoe Family, who drummed and sang in honor of the salmon that had returned to the Mashel River in Eatonville. In gratitude for sponsoring and helping organize the first Eatonville Salmon Fest, Eatonville Mayor Ray Harper presented the tribe with a print of a Native American man playing a flute, calling back salmon to the stream at his feet. Nisqually Tribal Councilmember Stephanie Scott, accepted the work of art for the tribe.

Good weather, salmon in the Mashel River, and energetic volunteers all contributed toward making this event a success, and everyone agreed that it should be an annual celebration in honor of the returning salmon.

Photo: Don Perry



Nisqually Elder Bob Sison, offering a blessing at the Eatonville Salmon Fest.

Nisqually Tribal Councilmember Stephanie Scott, and Eatonville Mayor Ray Harper.



Fin, the giant salmon, provided children a chance to climb inside and learn about the natural history and life cycle of native fish.

In return for the skills and knowledge learned, students are asked to return 40 hours of volunteer time to help restore habitat areas, collect stream-bug or water samples for water quality analysis, staff Stream Stewards display at community events, collect salmon spawning data, or helping build Rain Gardens, to name just a few possibilities.

To enroll in the Stream Stewards course for 2014, contact Don Perry. Outreach & Education Coordinator, at (360) 438-8687 ext 2143, or perry.don@nisqually-nsn.gov. Early registration is recommended, as seating is limited to the first 20 applicants.

2013 Stream Stewards processing benthic macro-invertebrates collected on Ohop Creek.



Photo: Don Perry



VOLUNTEER SPOTLIGHT

This issue's Volunteer Spotlight acknowledgment goes to Martin McCallum.

Photo: Don Perry



Martin McCallum, helping sort fish at the Nisqually Tribe's fish weir.

Martin McCallum

Since even before retiring in early 2013, Martin has been busier than two or three volunteers, as a graduate of the Nisqually Stream Stewards course, becoming a Stream Steward Salmon Watcher, a docent at the Nisqually National Wildlife Refuge and Kennedy Creek Nature Trail, a Thurston County Stream Team Steward, and a Land Steward for the Nisqually Land Trust.

If that wasn't enough to keep him busy, in the past year Martin worked on various teams collecting benthic macro invertebrates (stream bugs) in Yelm Creek, nature mapping along Red Salmon Creek, restoration site maintenance at Braget Marsh, and staffing the Nisqually Stream Stewards display at the 24th annual Nisqually Watershed Festival.

"The Nisqually Stream Stewards course really helped improve my understanding of Nisqually River geology, restoration biology, and salmon recovery projects. The course also gave me a chance to hear first-hand from tribal elders about the Nisqually Indian Tribe's deep connection to the river and its area prairies," said Martin McCallum.

VOLUNTEER CALENDAR

FEBRUARY 1, 2014

SATURDAY ■ 9 am to 12 noon
Site Steward Training
Contact: volunteer@nisquallylandtrust.org
(360) 489-3400

FEBRUARY 8, 2014

SATURDAY ■ 9 am to 12 noon
Amphibian Survey Training
Contact: Jessica.moore@nwtrek.org
(360) 832-7160

MARCH 22, 2014

SATURDAY ■ 9 am to 12 noon
Powell Pasture Nature Map
Contact: Jessica.moore@nwtrek.org
(360) 832-7160

APRIL 5, 2014

SATURDAY ■ 9 am to 12 noon and 1 pm to 4 pm
Biological Survey at Ohop Creek
Contact: Don Perry, perry.don@nisqually-nsn.gov
(360) 438-8687 ext 2143

JUNE 4 THRU JULY 19, 2014

WEDNESDAY EVENINGS & SATURDAYS
Stream Stewards Training Course
(free training)
Contact: Don Perry, perry.don@nisqually-nsn.gov
(360) 438-8687 ext 2143